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New insights into the structure and stratigraphy of the Swedish sector of the Baltic Sea sedimentary Basin from vintage 2D marine seismic data

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A large dataset originally acquired by the Swedish Oil Prospecting CO. (OPAB) between 1970 and 1990 including 2D marine seismic data, well log data, core data and seismic interpretations has recently been made available by the Swedish Geological Survey (SGU). In this study this dataset has been used to produce a set of regional geoseismic sections across the Swedish sector of the Baltic Sea. Regional depth structure maps detailing the deep structure of the basin produced from previous interpretations are also presented.

The Baltic Sea Basin is an intra-cratonic basin located in northern Europe. The Swedish sector of the basin is characterised primarily by two structural elements, the Hanö Bay Basin and the Baltic Syneclise. The largest of these, the Baltic Syneclise, is a large synclinal depression formed during the Caledonian Orogeny. The Hanö Bay Basin was formed during the Mesozoic due to subsidence along the Christiansø Fault Zone. The Swedish sector of the Baltic Sea Basin is primarily characterised by a sequence of shallow marine Cambrian sediments overlain by a relatively thin succession of Ordovician marine limestone and marls; these are in turn overlain by a thick layer of marl, siltstone and claystone deposited during the Silurian. Mesozoic sediments are found in the Hanö Bay and outer Hanö Bay area. These were deposited in areas of local subsidence, associated with transtensional tectonics prevalent within and adjacent to the Tornquist Zone, during the Late Carboniferous/Early Permian. Block faulting occurring throughout the Mesozoic also affected sedimentation patterns in the area.

In this study a sparse grid of marine seismic reflection profiles have been reprocessed across the Swedish sector of the Baltic Sea Basin. These have been interpreted based on the available well data and synthetic seismograms. Several regional seismic profiles were constructed which detail the major structural elements and basin stratigraphy across the Swedish sector. A series of Ordovician carbonate mounds can clearly be observed along parts of the profiles, allowing inferences about the Ordovician depositional environment to be made. Sub-Cambrian reflections are also observed which are tentatively interpreted as Jotnian in age. In addition, previously existing regional seismic interpretations have been digitised and checked against the re-processed seismic data. These have then been used to generate depth structure maps detailing the top of the Cambrian sediments and the top of a Mid-Silurian limestone interval. These maps provide insight into the deep structure of the basin.